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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,620	05/26/2005	Robert Mark Stefan Porter	282542US8XPCT	9279
22850 7590 01/02/2008 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER REDDING, THOMAS M	
			ART UNIT	PAPER NUMBER
			2624	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/536,620	Applicant(s) PORTER ET AL.	
	Examiner Thomas M. Redding	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 10 and 14-21 is/are rejected.
- 7) ☒ Claim(s) 8, 9 and 11-13 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>6/27/2005 and 5/26/2005</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it contains a title, "Face Detection", and also contains extraneous text at the bottom referring to a figure "Figure 14". Correction is required. See MPEP § 608.01(b) and 37 CFR 1.72 (b).

A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading "Abstract" or "Abstract of the Disclosure." The sheet or sheets presenting the abstract may not include other parts of the application or other material. The abstract in an application filed under 35 U.S.C. 111 may not exceed 150 words in length.

The purpose of the abstract is to enable the United States Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. (37 CFR 1.72 (b))

The abstract should also be limited to a single paragraph. Correction is required.

2. The specification in its current form is without section headings for the Background of the Invention, Brief Summary of the Invention, Brief Description of the Drawings and the Detailed Description of the Invention. The examiner suggests that the applicant update the specification to conform to customary US practice. See MPEP § 608.01(c-g).

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims 18-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 18 defines computer software embodying functional descriptive material. Claim 19 defines a medium providing program code embodying functional descriptive material. Claim 20 defines a storage medium embodying functional descriptive material. However, the claims do not define a computer-readable medium or computer-readable memory and are thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function

of the descriptive material to be realized” – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claim(s) to embody the program on “computer-readable medium” or equivalent; assuming the specification does NOT define the computer readable medium as a “signal”, “carrier wave”, or “transmission medium” which are deemed non-statutory (refer to “note” below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

“A transitory, propagating signal ... is not a “process, machine, manufacture, or composition of matter.” Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter.” (*In re Petrus A.C.M. Nuijten*; Fed Cir, 2006-1371, 9/20/2007).

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a “signal”, the claim as a whole would be non-statutory. In the case where the specification defines the computer readable medium or memory as statutory tangible products such as a hard drive, ROM, RAM, etc, as well as a non-statutory entity such as a “signal”, “carrier wave”, or “transmission medium”, the examiner suggests amending the claim to include the disclosed tangible

computer readable media, while at the same time excluding the intangible media such as signals, carrier waves, etc.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 21 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 21 as a whole defines a transmission medium and "[a] transitory, propagating signal ... is not a "process, machine, manufacture, or composition of matter." Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter." (*In re Petrus A.C.M. Nuijten*; Fed Cir, 2006-1371, 9/20/2007).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 4-6, 15, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rui et al. (US 2003/0103647).

Regarding claims 1 and 17, Rui discloses [a] face detection apparatus ("FIG. 17 illustrates a general computer environment 600, which can be used to implement the automatic detection and tracking of multiple individuals described herein", Rui, paragraph 210 and figure 17) for tracking a detected face between images in a video sequence, the apparatus comprising:

a first face detector for detecting the presence of face(s) in the images (Rui, Figure 7, reference 324); a second face detector for detecting the presence of face(s) in the images (Rui, figure 7, reference 334); the first face detector having a higher detection threshold than the second face detector, so that the second face detector is more likely to detect a face in an region in which the first face detector has not detected a face (Rui, figure 7, reference 334 Multi-view face detection and "Multi-view face detection module 166 uses one or more detection processes that attempt to detect human faces in different poses or from multiple views (that is, to detect the faces even though the head may be tilted, rotated away from the image capturing device, etc.). Any of a wide variety of face detection techniques can be used by multi-view face detection module 166", Rui, paragraph 92, the multi-view technique is more likely to find a match in that it is designed to match against multiple orientations rather than the single orientation used by the first detector); and

a face position predictor for predicting a face position in a next image in a test order of the video sequence on the basis of a detected face position in one or more previous images in the test order of the video sequence; in which: if the first face detector detects a face within a predetermined threshold image distance of the predicted face position, the face position predictor uses the detected position to produce a next position prediction ("a prediction is made as to where the object will be in the current frame t based on the tracking results from the previous frame $t-1$ and the object's dynamics", Rui, paragraph 108);

if the first face detector fails to detect a face within a predetermined threshold image distance of the predicted face position, the face position predictor uses a face position detected by the second face detector to produce a next position prediction (Rui, figure 7, the second detector only operates if the first detector is unsuccessful, so if the second detector detects a face, the position information from the second detector will be used to calculate the next position).

Regarding claim 2, Rui teaches [a]pparatus according to claim 1, in which the first face detector is operable:

to derive a set of attributes from regions of each successive image ("During operation, detection and tracking module 132 analyzes content on a frame by frame basis", Rui, paragraph 41);

to compare the derived attributes with attributes indicative of the presence of a face ("If the region does resemble a human upper body, then the portion of the region including the head (but excluding the shoulders) is extracted", Rui, paragraph 69);

to derive a probability of the presence of a face by a similarity between the derived attributes and the attributes indicative of the presence of a face ("hierarchical verification module 142 generates a new confidence level for the region", Rui, paragraph 43); and

to compare the probability with a threshold probability ("When re-verifying a region, hierarchical verification module 142 generates a new confidence level for the region and compares the confidence level to the threshold value", Rui, paragraph 43)

Regarding claim 4, Rui teaches an [a]pparatus according to claim 1, in which the second face detector is operable to compare the colours of image regions with colours associated with human skin ("Multi-view face detection module 166 uses one or more detection processes that attempt to detect human faces in different poses or from multiple views", Rui, paragraph 92, Any method of analysis used by Rui's second detector will need to make use of pixel intensity or color since that is really the only information that an individual pixel carries).

Regarding claim 5, Rui teaches an [a]pparatus according to claim 4, the apparatus being operable to discard a face track if the second detector detects that the

detected face differs by more than a threshold amount from a skin colour (Rui, figure 7, if the second face detector 334, does not find a face 336, the face track is dropped 338).

Regarding claim 6, Rui teaches [a]pparatus according to claim 1, in which the face position predictor is initiated only in response to a face detection by the first face detector ("the position of the face can be estimated at a coarse level based on the located set of points, and then this coarse estimation used as the initial guess in the parametric contour -tracking process discussed above", Rui, paragraph 162).

Regarding claim 15, Rui teaches [v]ideo conferencing apparatus comprising apparatus according to claim 1 ("FIGS. 1 and 2 illustrate exemplary environments in which robust automated detection and tracking can be used. In FIG. 1, multiple (n) video conferencing systems 102 are able to communicate audio/video content to one or more of each other"; Rui, paragraph 27 and figure 1)

Regarding claim 18, Rui teaches [c]omputer software having program code for carrying out a method according to claim 17 ("FIG. 7 is a flowchart illustrating an exemplary process 320 for performing hierarchical verification. Process 320 is performed by hierarchical verification module 142 of FIG. 3, and may be performed in software", Rui, paragraph 84).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rui et al. (US 2003/0103647) in combination with Moghaddam et al. (IEEE, TPAMI Vol 19, 1997).

Regarding claim 3, Rui teaches [a]pparatus according to claim 2.

Rui does not teach in which the attributes comprise the projections of image areas onto one or more image eigenvectors.

Moghaddam, working in a similar problem solving area of face recognition does teach attributes that comprise the projections of image areas onto one or more image eigenvectors ("we must incorporate the underlying probability distribution of the object. Subspace methods and eigenspace decompositions are particularly well-suited to such a task", Moghaddam, page, 696, Section 1.1, first paragraph).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the eigen-space method as taught by Moghaddam in the face detection and tracking system of Rui to implement a face recognizer that can provide a compact and parametric description of the object's appearance and also automatically identify the degrees-of-freedom of the underlying statistical variability (Hoghaddam, page 697, first paragraph). It also would allow making generic detection of faces possible as opposed to more stringent template matching methods.

7. Claims 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rui et al. (US 2003/0103647) in combination with Zhang et al. (US 6, 298,145).

Regarding claim 7, Rui teaches an [a]pparatus according to claim 1.

Rui does not teach if the face detectors fail to detect a face within a predetermined threshold image distance of the predicted face position, the face position predictor uses the predicted face position to produce a next position prediction.

Zhang, working in the same problem solving area of face detection does teach if the face detectors fail to detect a face within a predetermined threshold image distance of the predicted face position, the face position predictor uses the predicted face position to produce a next position prediction ("even if the face detector 41 fails to detect any face in the current I frame, the face tracking information from the face tracker 42 may still cause the face detector 41 to regard the current I frame as a face image frame", Zhang, column 9, line 3).

It would have been obvious at the time the invention was made to use the prediction extension method of Zhang with the face tracking system of Rui to attempt to preserve tracking when a noise or a temporary obstruction defeats the face detector for a given frame.

Regarding claim 10, the combination of Rui and Zhang teaches an [a]pparatus according to claim 1, in which if two faces are being tracked in respect of an image, one track is discarded so that:

a track based on a detection by the first detector has priority over a track based on a detection by the second detector or a predicted position (Rui, figure 7, the second detector only operates if the first detector is unsuccessful, so if the first detector finds a face, it has priority over the second); and

a track based on a detection by the second detector has priority over a track based on a predicted position ("even if the face detector 41 fails to detect any face in the current I frame, the face tracking information from the face tracker 42 may still cause the face detector 41 to regard the current I frame as a face image frame", Zhang, column 9, line 3, Zhang only extends the previous prediction when the detector fails, similar to the above condition, the second detector has priority over the tack based on a previous predicted position as a successful detection prevents extending the previous position prediction).

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rui et al. (US 2003/0103647) in combination with Magarey (US 2003/0053661).

Regarding claim 14, Rui teaches an [a]pparatus according to claim 1.

Rui does not teach an apparatus being operable to discard a face track if the detected face has an inter-pixel variance lower than a first threshold amount or higher than a second threshold amount.

Magarey, working in the same problem solving area of feature tracking does teach to discard a face track if the detected face has an inter-pixel variance higher than a threshold amount ("comparing said feature data with reference data, wherein a difference between said feature data and said reference data that is larger than a first predetermined number indicates that track of said feature has been lost", Magarey, paragraph 5).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the thresholded distance test of Magarey with the face detection and tracking system of Rui to determine when a loss of tracking has occurred to avoid useless computation when the target has disappeared ("The feature may be occluded by another object, or suddenly change course, so that predictive motion estimation fails and tracking is lost. In these cases, tracking should be halted and the system notified of the "loss-of -track" (LOT) condition. However, the nature of motion estimation is such that a vector is always returned whether or not the feature is still actually visible near the predicted position", Magarey, paragraph 8).

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rui et al. (US 2003/0103647) in combination with Li (US 2002/0150280).

Regarding claim 16, Rui teaches an apparatus according to claim 1.

Rui does not teach using his apparatus to implement a [s]urveillance apparatus.

Li working in the same problem solving area of face detection does teach the use of face detection in surveillance ("face detection also has numerous other applications including surveillance systems", Li, paragraph 4).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to apply the face detection and tracking method of Rui in a surveillance system as suggested by Li in order to find other applications for his apparatus and to increase marketing potential.

Allowable Subject Matter

10. Claims 8, 9 and 11-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 8, the prior art of record does not teach discarding a face tracking position if for more than a specified proportion of images, a predicted position is used to make further position predictions.

Regarding claim 9, the prior art of record does not teach discarding a face tracking detection if a secondary detector is relied upon for position prediction for more than a predetermined proportion of images.

Regarding claim 11, the prior art of record does not teach if a detector is tracking two faces, the track corresponding to the smaller face is discarded.

Regarding claim 12, the prior art of record does not teach at least two consecutive detections by a first detector is required before starting a face track.

Regarding claim 13, the prior art of record does not teach where at least g face detections are required every n frames in order to maintain a face track.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas M. Redding whose telephone number is (571) 270-1579. The examiner can normally be reached on Mon - Fri 7:30 am - 5:00 pm EST.

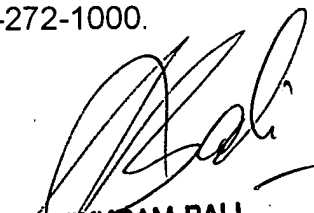
Application/Control Number:
10/536,620
Art Unit: 2624

Page 16

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TMR/



VIKKRAM BALI
PRIMARY EXAMINER